transmit power is too low. This power control command, in the preferred embodiment, is two modulation symbols. The preferred embodiment format of such a word is illustrated in FIG. 4.

In the preferred embodiment, the power control bit of the present invention is set by the base station according to the following conditions. The power control bit is set to a 1, instructing the mobile radio to decrease its power output if the following condition is true:

$$\left(\sum_i (E_b/I_o)_i \geqq \text{allocated } E_b/I_o\right)$$

OR

$$\left(\left(\min_i (E_b/I_o)_i\right) > \text{desired } E_b/I_o\right)$$

where i=the $i^{th}$ mobile radio.

The power control bit is set to a 0, instructing the mobile radio to increase its power output if the following condition is true:

$$\left(\sum_i (E_b/I_o)_i < \text{allocated } E_b/I_o\right)$$

AND

$$\left(\left(\min_i (E_b/I_o)_i\right) \leqq \text{desired } E_b/I_o\right)$$

where i=the $i^{th}$ mobile radio.

In other words, the first condition (step **125**) is true when the total or sum of the $^{Eb}/_{Io}$ 's of all the mobile radios communicating with the base station is greater than or equal to the maximum $^{Eb}/_{Io}$ or when the minimum $^{Eb}/_{Io}$ of any one of the mobile radios is greater than the desired $^{Eb}/_{Io}$. In this case, the total amount of $^{Eb}/_{Io}$ that has been allocated to the reverse packet channel has been exceeded as might be the case when too many mobile radios are transmitting. A particular mobile radio's $^{Eb}/_{Io}$ could also have been higher than needed and the received signal may perturb the remaining reverse packet channel users so the mobile radio's power output needs to be decreased (step **130**).

The second condition (step **135**) is true when the sum of the $^{Eb}/_{Io}$ 's of all the mobile radios communicating with the base station is less than the maximum $^{Eb}/_{Io}$ and when the minimum $^{Eb}/_{Io}$ of any one of the mobile radios is less than or equal to the desired $^{Eb}/_{Io}$. In both cases, the mobile radio's $^{Eb}/_{Io}$ is too low and the received signal may not be demodulated correctly so the mobile radio's power output needs to be increased (step **140**).

Alternate embodiments of the power control process of the present invention uses other conditions yielding similar results. Also, the other comparison thresholds mentioned above could be substituted in the above conditions to yield similar results.

In an alternate embodiment of the power control process of the present invention, the base station determines if the command to increase power will cause the mobile radio's power output to exceed the allocated $^{Eb}/_{Io}$. If this is true, the base station commands the mobile radio to decrease its transmit power instead of increasing.

If there is a single transmission on the reverse packet channel of the present invention, power control is performed on the traffic channel as discussed in U.S. Pat. No. 5,056,109 to Gilhousen et al. and assigned to Qualcomm, Inc. When there are multiple transmissions, the base station tries to keep the mobile radio with the poorer $^{Eb}/_{Io}$ at the allocated $^{Eb}/_{Io}$, subject to the constraint that the total received $^{Eb}/_{Io}$ is not too great.

An example of the above described power control process is illustrated in FIG. **9**. FIG. **9** shows a plot of the transmit power of two users, A and B. The desired $^{Eb}/_{Io}$ is the lower threshold while the upper threshold is the allocated $^{Eb}/_{Io}$. The upper curve shows $\Sigma^{Eb}/_{Io}$ that, in this case, is A+B. The power control commands transmitted by the base station are illustrated at the bottom of the plot.

The initial portions of the user A and user B waveforms are both above the desired $^{Eb}/_{Io}$ and the $\Sigma^{Eb}/_{Io}$ is above the allocated $^{Eb}/_{Io}$. Using the process of the present invention, the base station sends out power control commands instructing the mobiles to turn down their transmit power. As required by IS-95 7.1.3.1.7, a two power control group delay issued before a power control command is implemented. Therefore, the plot shows that the power does not decrease until the slot i+2. This is illustrated in FIG. **4**.

After four decrease power control commands, the user B transmit power is below the desired $^{Eb}/_{Io}$. The base station then sends three turn up commands. After the two power control group delay, the output power of user B is above the desired $^{Eb}/_{Io}$ and the $\Sigma^{Eb}/_{Io}$ is above the allocated $^{Eb}/_{Io}$. This process continues in a similar manner.

If a large number of transmissions are received on a busy channel, the power control process of the present invention limits the power output at the allocated $^{Eb}/_{Io}$. This will likely force a higher error rate in some packet transmissions. In this case, the base station can make the decision to power control only a few streams by making the minimum $^{Eb}/_{Io}$ in the above conditions over a subset of the received transmissions. This will likely limit the impact on other mobile radios.

In the preferred embodiment, the desired $^{Eb}/_{Io}$ can be adjusted for different channel conditions so as to maintain a desired packet error rate. If the packet error rate is too high for a desired $^{Eb}/_{Io}$, the base station can increase the desired $^{Eb}/_{Io}$, thus lowering the packet error rate. Alternatively, if the packet error rate is lower than needed, the base station can decrease the desired $^{Eb}/_{Io}$, thus increasing the packet error rate.

This latter adjustment serves to increase the overall system capacity. The adjustments mentioned above may need to be done for different channel conditions. For example, if there are many multipath components, the base station may not be able to combine energy as effectively. In the art, this is called combining loss. On the other extreme, fading may cause a higher packet error rate if there is only one multipath component. To maintain a low packet error rate in both these cases, the base station may increase the desired $^{Eb}/_{Io}$.

In the preferred embodiment, the desired $^{Eb}/_{Io}$ is the same for all mobile radios. Alternatively, the desired $^{Eb}/_{Io}$ could be different for each mobile radio. The previous equations can then be written as:

$$\left(\sum_i (E_b/I_o)_i \geqq \text{allocated } E_b/I_o\right)$$

OR

$$(\forall i|((E_b/I_o)_i > \text{desired}(E_b/I_o))_i)$$

where i=the $i^{th}$ mobile radio and $\forall i|$ signifies that for all i, such that if the above is true, the mobile radio is told to decrease its power; and

$$\left(\sum_i (E_b/I_o)_i < \text{allocated } E_b/I_o\right)$$

AND